RANGE CONSERVATION GUIDE

April, 1951

UNITED STATES
DEPARTMENT OF AGRICULTURE
U.S. Soil Conservation Service
Pacific Region

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Acknowledgements

The material in this issue of the Region 7 Range Conservation Guide is largely a revision and reconstruction of the Range Handbook. It was developed during a range conference January 29-31, 1951, Portland, Oregon. Material has been drawn from a number of sources, including field experience of Service workers and ranchers. The principal sources of reference material of record, other than unpublished reports and data, are listed in the back.

W. T. White,
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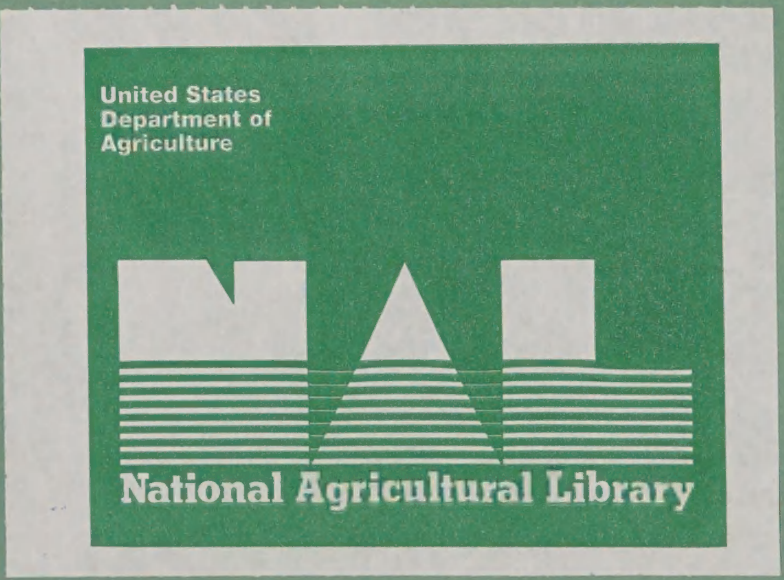


HOW TO CLASSIFY GRASSLANDS AND DEVELOP COORDINATED SOIL AND WATER CONSERVATION PROGRAMS FOR THEM

INDEX

April, 1951

HOW TO CLASSIFY GRASSLANDS AND DEVELOP COORDINATED SOIL AND WATER CONSERVATION PROGRAMS FOR THEM

Foreword

On rangelands, soil and water conservation (range forage improvement) is obtained primarily by improvement of the vegetation. It is necessary, therefore, to know the significance of various combinations of plants and other factors found on the range, such as litter, mulch, and associated erosion activity. Determination of range condition is, in effect, a summary of the kind and amount of climax and other invading vegetation, and their associated soil, plant residues, and litter conditions found on the range.

Present grazing capacity and potential forage production of the range are important, but the operator must know much more than this; particularly does he need to know the present condition of his range, its present forage yield, and the improvement in the kind, quality, and production of forage to be expected from proper use and treatment. A knowledge of the principal factors of range condition -- the inherent potentialities of major land sites, the climax, desirable, and invading vegetation, the effectiveness of such vegetation in controlling erosion, and the quantity and value of important range plants for grazing -- is essential to an understanding of grazing problems.

What a rancher needs to know about his range and how to develop a conservation program.

Once range users and range conservationists become familiar with local range sites, condition classes, and safe stocking, it becomes relatively easy to work out an effective range forage improvement program.

For example, in our specialized era, the things we use are usually classified according to size or amount and quality. Cattle are classified into choice, good, common, canners and culls - each grade denoting quality with which is associated significant price differentials. These classes have pocketbook significance.

However, grades or classes of range for an important resource like our grasslands, which feed half of the United States' livestock each year, are still known to only a comparatively few ranchers and little understood, despite the fact that the classes of grazing land have as much or more significance to ranchers than many other classified resources.

Men trained to read and interpret the natural patterns of land and vegetation can tell how good a range is by looking at it. Grading ranges according to site variations and range condition classes helps landowners tell how good a range is and how much better it may become under correct use.

Spread over the grazing lands where they have not been overgrazed are many kinds of plants combined into distinguishable patterns of climax species adapted to the various sites or different parts of the range. Where ranges have been overgrazed, other kinds of plant groups are found. These also can be readily recognized and classified. The climax plants are symbolic of the supreme development of the climate and other elements of the environment in which they grow. Plant community patterns vary largely because of difference in available moisture which is influenced by precipitation, soil, topography, temperature, light, elevation, and latitude. For example, in the sub-humid and semi-arid areas of the natural grasslands of the Pacific Northwest, the high yielding wheatgrasses, fescues, taller bluegrasses, wildryes, perennial bromes, and prairie June grass (in small amounts) are climax. In the arid

areas, examples are Indian rice grass, needle-and-thread, western dune grass and drought enduring shrubs and forbs -- species that dominate the climax plant community on these dry sites. Pine and fir trees grow in the mountains, sometimes with grass as an understory, where coolness and higher rainfall provide for their special needs.

Clements (1936) points out why local plant communities may differ:

"The major examples....are provided by valleys, especially gorges and canyons, long and steep slope-exposures, and by extreme soil type,such as sand and alakali. This complex arrangement of different communities produced by a graduated compensation in terms of available water across a valley or embraces the differentiation brought about by shifting slope-exposures around a mountain or on two sides of a ridge. In the case of such soils as sand or gravel at one extreme and stiff clay at the other, the kind of plant community found there may sometimes be different than just indicated. This is because sand affords a haven for post climax relicts (a climax plant community requiring better moisture conditions than prevail in the local climate) in the dry prairie and for preclimax ones (climax plant communities that persist in moister regions than normal) in humid forest region, while the effect of heavy soils is just the reverse. However, this is readily understandable because of the difference in absorption, availability of soil water to plants, and evaporation between sandy and heavy soils."

Conservation objective of range improvement in the Pacific Coast Region

The objective of the range improvement phase of the soil and water conservation program in the Pacific Coast Region is to:

1. On perennial grass ranges

   a. Maintain, through careful management, the (climax) forage types on those ranges in excellent condition.

   b. Improve and increase the climax plants, through careful management, on those ranges in good and fair condition.

   c. Improve the vegetal cover on those ranges in low fair and poor condition by reseeding suitable sites with adapted perennial grasses and legumes that are similar to, or better than, climax species in the quality and quantity of forage produced.

   d. Maintain sustained maximum forage production on reseeded range lands through careful management.

2. The objective of range conservation planning in annual grass range in Central and Southern California is to improve annual grass forage production.

   a. Maintain, through careful management, the most productive and nutritious annual and perennial forage plants, where they occur, on those ranges that are in excellent condition.

   b. Improve and increase, through careful management, the high yielding, high quality, annual and perennial forage plants on those ranges in good and fair condition.

   c. Restore a high yielding, high quality forage cover on those ranges in low fair and poor condition, by fertilizing and/or reseeding suitable sites with adapted annual or perennial grasses and legumes.

   d. Maintain improved fertilized and/or reseeded range lands in sustained maximum production through careful management and continued fertilizing.

Classifying important range sites

Range sites are unit range areas, which because of significant differences in environment (soils, topography and climate) support in their climax, or in their most productive stage (in the case of high yielding annuals) distinctly different plant communities which:

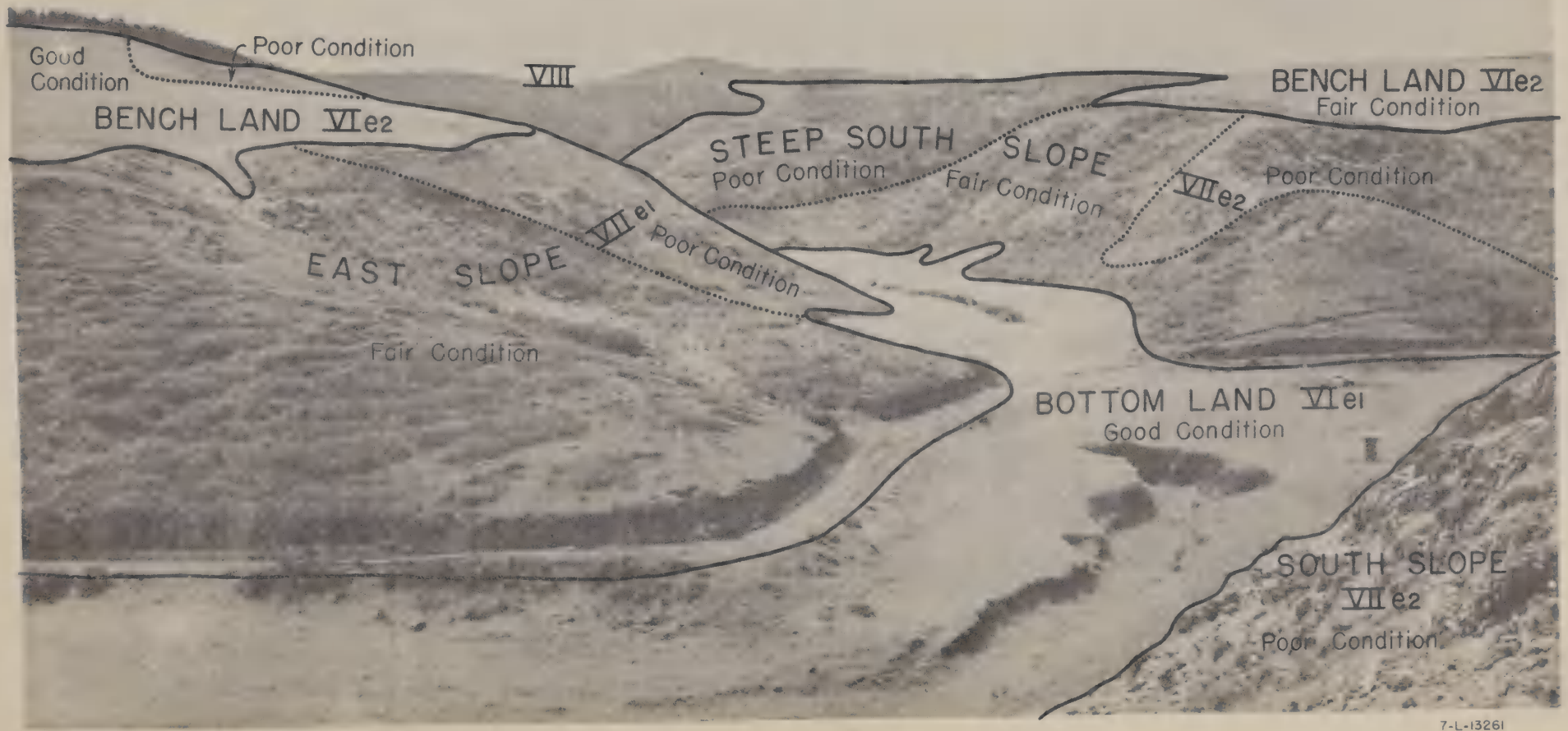
1. Have importantly different forage production potentials.

RANGE SITES & RANGE CONDITION CLASSES

EXAMPLES

Range Site = Bench Land VI e2

Range Condition = Good Condition



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2. Are capable of maintaining an equilibrium with their environment if not excessively disturbed by such things as fire, overgrazing, insect infestations, etc.

3. Present certain management problems which are different from the grazing problems found on other sites.

When identifying range land sites, we are guided by the following considerations:

1. Keep the number of sites to the absolute minimum.

2. Make site separations only where there are:

   a. Significant differences in soils, particularly their productive capacity to grow range forage.

   b. Significant differences in climax vegetation.

   c. Significant differences in the yield of usable forage.

   d. Significant differences in the annual plant communities in Central and Southern California.

Description of sites

It is the joint responsibility of the soil scientist and the range conservationist to determine and establish range sites. The sites will be named and the more important vegetation and soil groups listed for each site. The site name should be one by which it is locally known, or if it has no local name, give it a suitable descriptive name. Examples of range site names developed for the Mud Lake Soil Conservation District are given below (taken from Guide to Range Condition Classes for Mudlake Soil Conservation District). The sites were determined by survey on the ranges in the district.

Site 1 - Lava Plains

The Lava Plains, sometimes called Lava Beds, includes the area in Jefferson County, Idaho, lying generally northeast, east, southeast, and south of Terreton, Idaho.

The average annual precipitation ranges between 7 and 11 inches. High winds are common during the spring and fall seasons.

The topography is from flat to gently rolling, with slopes from 1 to 20%. Much of the area has no particular drainage.

The soils are coarse, medium and light in texture, light colored, shallow to moderately deep. The underlying material is basaltic bedrock.

Within the Lava Bed site are sandhills stabilized by grasses and brush, and rocky (scabland) areas. The sandhills and scabland areas are intermingled and need not be mapped or treated separately; but care must be taken when preparing range conservation plans to insure that the sandy areas are carefully managed or soil blowing may result.

In excellent condition, the vegetation of this site consists largely of Western dunegrass, needlegrass, tall bluegrass, sand dropseed, Indian ricegrass, chokeberry and bitterbrush. With moderate range deterioration, such grasses as the needlegrass, Indian ricegrass, tall bluegrass, sand dropseed, and bitterbrush decrease; while marked increases occur of such species as sagebrush, rabbitbrush, horsebrush and snakeweed, Sandberg's bluegrass, lupin, phlox, and annual plants; when the sites are rapidly deteriorating, the vegetation may consist of rabbitbrush, snakeweed, and Russian thistle.

Site 2 - Alluvial Fans

This site includes the area in Jefferson County found generally west and northwest of Terreton, Idaho.

The average precipitation ranges from 7 to 11 inches, annually.

The topography is nearly level to gently sloping to the east. There is little erosion hazard and no natural water drainageways.

These soils are coarse, medium and light in texture, light colored. They are droughty and excessively drained. They are graded material derived from alluvial fan material, deposited over sedimintary lake deposits. They gradually get finer from west to east. Much of the soil is gravelly throughout.

In excellent condition, wheatgrass, needlegrasses, Indian ricegrass, bitterbrush, shodscale, and winterfat make up the vegetation. As the range deteriorates, sagebrush increases to where it makes up the primary vegetation. Horsebrush, rabbitbrush, snakeweed and annual weeds invade in abundance, where overgrazing is allowed to continue season after season.

Site 3 - Bottomlands

This site includes the valleys -- lowest and flatest lands in and around such communities as Terreton, Hamer, Monteview and Mudlake.

The average annual precipitation for this site ranges from 5 to 9 inches.

The topography is generally flat. Exceptions are minor stream channels and scattered small soil hummocks which have formed from wind erosion, following fires and periods of overgrazing.

The soils vary from light to heavy in texture and are light colored. Some sand has been blown into the area now, and small to medium sized dunes are spotted throughout the site. The soils are primarily alluvial, having been lake deposited, but are generally classed as deep. They are fairly productive, but subject to blowing when tilled or overgrazed.

In excellent condition, the vegetation is largely wheatgrasses, bluegrasses, wild ryegrass, limited amounts of willow, sagebrush, greasewood, saltbush, Sandberg's bluegrass, sedges, and needlegrass are commonly present. As the range deteriorates, such plants increase as Sandberg's bluegrass, foxtail, meadow barley, sagebrush, rabbitbrush, and greasewood; and invader

plants, such as cheatgrass, gumweed and annual plants come in. In poor condition, the entire cover may consist almost entirely of one or more of the following: Russian thistle, cheatgrass, and snakeweed.

Range Condition Classes

Ranges are first broken into distinctive units called sites on the basis of their soils, slope, topography, climate and broad vegetal types. Each site has a different climax or identifiable plant community, recognized partly in terms of different kinds of plants but frequently also in terms of productivity. The climax stage of vegetation is attained when the soil and vegetation are in equilibrium with the climate. On sites that are grazed properly for a long time, ranges are easily maintained in excellent condition; but under improper grazing, burning, and accelerated erosion, all ranges degrade to poor and even depleted condition. Between the top of excellent condition or climax and bare soil, the plant community found indicates a particular stage on the plant succession scale, and will fall into one of the described condition classes.

The climax plants for each site must first be determined from relict areas or on well managed ranges. The climax becomes the base point from which range condition classes are keyed. Once the climax is determined, the classification of the four range conditions are developed by properly cataloging climax plants (1) that decrease, (2) those that increase under heavy grazing use, and (3) those that invade. It is possible to segregate several classes at any point along the plant succession scale. However, for simplicity in classifying range condition for practical use, the plant succession scale has been broken into only four divisions. Each division or segment is called a range condition class.

UPPER SNAKE RIVER PLAINS SITE

GRASS-SAGEBRUSH RANGE IN EXCELLENT CONDITION
This range is producing the maximum -- 800 to 615 pounds air dry usable forage per acre. Climax or decreaser plants make up 95% of the total vegetation. Sagebrush is scarce.

GRASS-SAGEBRUSH RANGE IN GOOD CONDITION
This range is producing 3/4 of what it could -- 615 to 470 pounds air dry usable forage per acre. Climax or decreaser plants make up 70% of the total vegetation. Some sagebrush and weeds are present.

660 - SCS - PORTLAND, OREG. APRIL 1951

GRASS-SAGEBRUSH RANGE IN FAIR CONDITION

This range is producing 1/2 of what it could — 470 to 320 pounds air dry usable forage per acre. Climax or decreaser plants make up 45% ofthe total vegetation Sagebrush and weeds ere abundant.

GRASS-SAGEBRUSH RANGE IN POOR CONDITION

This rangeis producing 45% of what it could -- 320 to 40 pounds of air dry usable forage per acre. Climax or decreaser plants make up only 20% of the total vegetation. Sagebrush has become the most abundant vegetation.

The excellent condition range class for each site consists of plant groups where:

1. 100 to 76 percent of the vegetal cover is composed of climax (original) vegetation.

2. In Central and Southern California, 100 to 76 percent of the vegetal cover is composed of desirable high yielding annuals and/or climax (original) vegetation.

Plant residues (litter, stubble, and mulch) are abundant, or at least adequate to maintain yields and prevent active erosion.

The good condition range class for each site consists of plant groups where:

1. 75 to 51 percent of the vegetal cover is made up of climax plants.

2. In Central and Southern California, 75 to 51 percent of the vegetal cover is made up of high yielding (desirable) annuals and/or climax (original) plants.

Plant residues (litter and mulch) are generally insufficient to maintain yields and prevent active erosion.

The fair condition class for each site consists of plant groups where:

1. 50 to 26 percent of the vegetal cover is still composed of climax plants.

2. In Central and Southern California 50 to 26 percent of the vegetal cover is still composed of high yielding (desirable) annuals and/or scattered climax (original) vegetation.

Plant residues (litter and mulch) are not generally sufficient to maintain or improve yields and prevent active erosion.

The poor condition range class for each site consists of plant groups where:

1. 25 to 0 percent of the vegetal cover is made up of climax plants.

2. In Central and Southern California, 25 to 0 percent of the vegetal cover is made up of high yielding (desirable) forage plants.

Plant residues (litter and mulch) on poor condition range are usually absent. Active, severe sheet and gully erosion are generally present.

In classifying the range condition classes for a site, the plant composition is determined. The percent of key climax and invading plants found among the plant communities are recorded as found. As an example, the pattern of land sites and range condition classes determined for the _____SCD are shown on page 11.

In determining range condition, certain plants are found only in small amounts in the climax. These plants are recorded only in limited amounts (generally not more than was found in the climax) because they increase as a result of heavy use or overgrazing. For example, the wheat bunchgrasses, climax plants, are relished by livestock and they decrease under heavy grazing. They are called decreasers and no limit is placed on them when we score a particular site. We count all that we find even when no other species are present. However, such climax plants as Sandberg's bluegrass, the needlegrasses, and perennial forbs increase for a while when others more readily taken are first being thinned by grazing. Since pure stands of any one of the "increaser" species, found only in limited quantities in the climax, alone cannot constitute a climax -- we count only that percentage that was found in the climax. Excessive numbers of invading plants, such as squirrel tail, snakeweed, and rabbitbrush always scale down condition classes in accordance with their abundance. If overgrazing is long continued, however, even these invaders are killed or reduced in numbers and are in turn replaced by even less palatable plants; generally brush or woody species.

RANGE CONDITION AND LAND CAPABILITY SITE GUIDE
SCD

Site Name	Lava Plains	Alluvial Fans	Bottom-lands
Soil Mapping Units	3C6B, 4C6B, 3L4B, 4L4B, 3M3B, 4M3B, 3M2B	4L7, 1M3 3L7, 1L4	1H2, 3H1, 3H26
Erosion (wind)	N, R, P	N, R, P	N, R, P
Slope %	0 - 20	0 - 10	0 - 5
Climatic Zone	7" - 11"	7" - 11"	7" - 11"
Land Capability Unit	VIIe3	VIe1	VIe1

Map, but exclude from acreages in determining stocking, ■■ Class VIII.

1. Inaccessible
2. Barren
3. Sand Dunes (active)
4. Slopes over 60%

Climax Vegetation

Decreasers All sites 1/	Increasers By sites 2/			
Wheatgrass	Needlegrasses	40	35	10
Perennial Brome	Needle & Thread	30	20	5
Perennial Fescues	Sandbergs bluegrass	20	20	10
Perennial Ryegrass	W. Dunegrass	All	10	0
Indian Ricegrass	Plains Reedgrass	15	15	0
Sand Dropseed	Balsamroot	5	15	0
Sedges (dryland)	Buckwheat	5	15	0
Vetch (lotus)	Yarrow	0 3/	5	10
Hawksbeard	Lupine	10	10	5
Wild Carrots	Big Sagebrush	15	15	5
Bitterbrush	Chokecherry	50	All	0
Fourwing Saltbush	Black Sage	10	20	0
Shadscale	Pussy Toes	0	0	0
Winterfat	Greasewood	0	0	5
Nuttal's Saltbush	Phlox	0	0	0
	Juniper	5	0	0

Invader Plants

Squirrel tail
Fox tail
Thistle
Locoweed
Death ■■■■
Cactus
Larkspur
Rabbitbrush
Horsebrush
Snakeweed
Annual grasses
Annual weeds

Approximate Yields (lbs. air dry) usable Forage per Acre			
Excellent Condition	600-400	700-550	1000-800
Good Condition	400-250	550-400	800-600
Fair Condition	250-150	400-200	600-400
Poor Condition	150-50	200-100	400-200

Approximate Stocking Rates in Acres Per A.U.M.			
Excellent Condition	1.3-2.0	1.1-1.5	0.8-1.0
Good Condition	2.0-3.2	1.5-2.0	1.0-1.3
Fair Condition	3.2-5.3	2.0-4.0	1.3-2.0
Poor Condition	5.3-16.0	4.0-8.0	2.0-4.0

Percent of cover composed of original (climax) vegetation

100% - 76%
75% - 51%
50% - 26%
25% - 0%

Litter, Residues, Mulch and Associated Erosion

Excellent Condition -Abundant, more than adequate to maintain yields and prevent active erosion
Good Condition -Slightly less than adequate to maintain yields, or prevent active erosion
Fair Condition -Inadequate to maintain yields, or prevent moderate amounts of active erosion
Poor Condition -Scarce to none, frequently but not always, inadequate to prevent active erosion

1/ Climax decreasers - count all ■■ climax vegetation
2/ Climax increasers - count only percent shown, being that proportion found in climax
3/ Less than 2½ in climax
4/ Final condition rating should agree with litter, etc. and associated erosion

Factors used in determining range condition classes

Methods of classifying range must be easily applied and readily understood if they are to have wide use. The more factors used in determining range conditions, the more complex the classification becomes.

In the Pacific Coast Region three factors have been found satisfactory for use in accurately determining the range condition classes on the range sites of the region. These factors are as follows:

1. Plant composition
2. Plant residue, litter and mulch conditions.
3. Degrees of active accelerated (man caused) erosion

Plant composition is listed first, because it is the most serviceable factor to use in determining range condition classes. It can be measured quickly and is primarily useful in making range condition determinations because every plant community is an index to a certain stage on the plant succession scale. Anyone familiar with stages of plant succession or retrogression can tell how good a range is.

Plant composition alone is a reliable index to use in range condition class determination, where the history of such sites generally show the following:

1. Critical soil losses have not yet occurred, and where most or all of the organic top soil is in place.
2. The changes in plant composition, from the climax to the annual grass and weed stage, have generally taken place with little or no loss of soil.
3. The present stand (density) of vegetation is essentially all that the site will support.
4. There is little or no evidence of currently active erosion.

The above conditions usually exist on range sites which have been subjected to not more than moderate overgrazing over a relatively long period of time. On these ranges the "decreaser" plants have been replaced by the "increaser" and "invader" plants in time to prevent critical erosion activity and soil loss.

Only a minority of the range sites in Region VII today present the conditions described above. Some special cases are also found on range sites typified by steep south facing mountain slopes and highly erodible soils, where severe overuse of the climax vegetation has caused an immediate decrease in the original stand or density, without a corresponding increase in increaser and invader plants.

Any marked decrease in vegetal cover (stand) is immediately associated with active sheet and rill erosion. The degree of erosion activity always expands as the stand declines, and soon becomes active enough to prevent the increaser and invader plants from occupying the space vacated by the killed out climax or desirable plants. It is not uncommon on such sites, under the use described above, to find the plant composition made up entirely of a sparse remnant stand of climax plants sitting on pedestals of soil, associated with severely active sheet, rill and gully erosion.

On sites long subjected to over use or fire, plant composition, adequacy of plant residues, litter, and mulch, and their corresponding degrees of erosion activity must all be used as criteria to accurately judge range conditions.

Essential steps in judging range condition

The procedure in judging range condition classes and initial stocking rates with ranchers in respective range sites is as follows:

1. Identify the range site you are in the process of examining and refer to the appropriate site column on the range condition guide sheet. (example, page 11)

2. Make a rapid preliminary examination of the site to determine and map the various condition classes found in the site. Use a dotted line to mark the boundaries of the different condition classes. The range site boundary (solid) lines serve as both site and condition class boundaries.

3. Examine each condition class mapped, and determine the average plant composition (% total vegetation column R7-128). Plant composition estimates are based on the relative proportion (expressed in percentages) of the total vegetal cover contributed by each major species or groups of minor plants which collectively make up an important part of the vegetal cover. In grouping plants be sure that the species grouped together can all be classed as decreasers, invaders, or increasers with the same percentage (see guide sheet, page 11) limitations for the "increaser" plants as found in the climax or desirable group. Don't group decreasers, invaders, and increasers together. Separate them into the three catagories.

4. Determine the climax or desirable portion (in percent) of the total plant composition. This is done on the condition class description sheet (R7-128, revised) by (1) recording the respective percentages of the important decreasers over in the climax (or desirable) column; (2) recording the allowable (climax or desirable) percentages of the respective important "increaser" plants in the climax portion column. (Recordable percentages are taken from the range condition guide sheet.)

5. The percentage total for the climax or desirable column serves as a basis from which to determine the range condition class, explained by the following example:

   For example, assume that the climax or desirable column percentages total 63 percent for an area of range in the Bottomland Site. See Range Condition Guide Sheet (page 11). Reference to the percent of cover composed of climax vegetation, see lower right-hand corner of guide, page 11, in respective condition classes places the area of range tentatively in the middle of the good condition class -- 63 percent climax is midway between 75 percent and 51 percent.

6. Judge and record, on the range condition class description form (R7-128, revised), the adequacy or degree of deficiency of plant residue, litter, and mulch, and their associated degree of erosion activity.

7. Compare the information recorded under No. 6 above with the range condition guide sheet (bottom of sheet) statement regarding the plant residue, litter, mulch, and erosion activity that are normally associated with the good condition class.

   If your recordings of plant residues, litter, mulch and erosion activity conditions are better than, or no more severe than those indicated on the range condition guide sheet for the good condition class, then the tentative good condition class (based on the climax portion of the total plant composition) becomes the final condition class rating. The range area described in the example, under No. 5 above is, therefore, rated in Good Condition.

8. Determine respective range condition class initial stocking rates using the climax or desirable portion (percent) as the basis for interpolation.

   Referring again to the example used in 5, 6, and 7 above, you will note that the range was determined to be in good condition class. The total climax portion equals 63 percent, which places this area of range in the middle of the good condition class. The good condition class initial stocking rates for the bottomland site vary from 1 A/CM (at the top of the class) to 1.3 A/CM (at the bottom of the class).

   Since 63 percent climax vegetation is midway between the top and bottom of the good condition class, it means that the initial stocking rate for this particular range area in the bottomland site is halfway between 1.0 A/CM and 1.3 A/CM. The difference between 1.0 and 1.3 = .3 A/CM, ½ of .3 A/CM = .15 A/CM or .2 A/CM (if rounded off to the nearest 1/10 A).

   1.0 A/CM + .2 A/CM = 1.2 A/CM (the estimated initial stocking rate).

9. The area of range described in the example under No. 5 is, therefore, shown on the map as in good condition. The initial stocking rate that should aid in improving the vegetal cover is estimated to be 1.2 A/CM.

   Note: Stocking rates for respective condition classes may be placed directly on the range condition map or left on the respective range condition class description sheets (R7-128 revised).

R7-128
(revised 4-13-51)

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service - Pacific Region

RANGE CONDITION CLASS DESCRIPTION FIELD SHEET

Ranch _____
Work Unit _____
Range Site Name _____
Planner _____

Sheet No. ____ Aerial Photo No. _____
Location, T. ____ R. ____ SEC. _____
Soil Mapping Unit _____
Range Site Symbol _____

Plant Groups	Plant Species or Groups	% Total Vegetation	% Climax or Des.
Grasses and Grass-like plants			
___%			
Forbs (Broad leaved herbaceous plants)			
___%			
Shrubs and trees			
___%			
100%	Totals	100%	

Plant Residues)
Litter)Assoc. with(Active
Mulch) (Erosion

(Circle ones which apply)

1. Adequate — 1. Non-Active
2. Slightly Deficient — 2. Slightly Active
3. Moderately Deficient — 3. Mod. Active
4. Scarce to None — 4. Severely Active

- - - - - - - - - - - - - -

Condition Class Based on Vegetation
(Circle one which applies)

Excellent — Fair
Good — Poor

Condition Class Based on Unsatisfactory Plant Residue, etc. and erosion condition:
(Circle one which applies)

Excellent — Fair
Good — Poor

- - - - - - - - - - - - - -

Estimated Forage Yield _____ lbs./Ac.
Estimated Initial Stocking Rate
_____ A/AUM
_____ A/SM
Estimated Initial Stocking Rate after available cut
_____ A/AUM
_____ A/SM

Forage Availability Cuts for
Slope _____% Rocks _____%
Brush _____% Lack of Water _____%
Unstable Soils _____% Erosion _____%
Other _____%

Total _____%

- - - - - - - - - - - - - -

Stock using the range:
Cattle Sheep Horses
(Circle the ones which apply)

Proper Grazing Season:
Spring Summer Fall Winter
(Circle the ones which apply)

(over)

AVAILABILITY CUT TABLE

To apply a 10% availability cut, multiply estimated stocking rate (A/AUM) by 1.11 --

10% cut, by 1.11	55% cut, by 2.22
15% cut, by 1.18	60% cut, by 2.50
20% cut, by 1.25	65% cut, by 2.86
25% cut, by 1.33	70% cut, by 3.33
30% cut, by 1.43	75% cut, by 4.00
35% cut, by 1.54	80% cut, by 5.00
40% cut, by 1.67	85% cut, by 6.66
45% cut, by 1.82	90% cut, by 10.00
50% cut, by 2.00	

ADDITIONAL COMMENTS

10. Again referring to the example given in No. 5, assume that your recordings pertaining to plant residues, litter, mulch, show these to be entirely absent. The plant cover, even though 63 percent climax, is made up of a sparce stand of remnants, sitting on pedestals and associated with severely active sheet, rill and gully erosion. What is the range condition class, and how do I estimate a conservation (forage improving) stocking rate?

11. The statements in No. 10 pertaining to plant residues, etc. and erosion activity correspond with those given at the bottom of the range condition guide sheet as associated with the poor condition class. The area of range would, therefore, be given a final condition class rating of Poor Condition, based on unsatisfactory plant residue and erosion conditions.

12. How do I determine the final (poor condition class) stocking rate? 63 percent climax tentatively placed the range in the middle of the good condition class. Consideration of the plant residue and erosion activity factors changed the rating to poor condition. Since 63% climax was in the middle of the good condition class, you may assume the condition of the range is changed to the middle of the poor condition class and proceed to determine the stocking rate in the following manner:

    The stocking rates for the top and bottom of the poor condition class in the bottomland site are 2 A/CM (at the top) and 4 A/CM (at the bottom) respectively. The difference between 2 A/CM and 4 A/CM equals 2 A/CM; $\frac{1}{2}$ of 2 A/CM = 1 A/CM; 2 A/CM + 1 A/CM = 3 A/CM or the estimated conservative (forage improving) stocking rate.

13. Under the conditions prevailing as described in 10 and 11 above, the area of range would be classed as in the poor condition class. The initial stocking rate that should aid in improving the vegetal cover is estimated to be 3 A/CM.

There are a number of other important factors that influence range condition too, but they are primarily useful in evaluating trends in range condition. Some of these factors are plant density, vigor, soil tilth, livestock gains, calving percentages, presence of increased numbers of seedlings of the good, or of the worthless plants, etc.

Ranges in excellent and good condition generally have better stands or densities than do ranges in fair and poor condition. But density varies so greatly that it is unreliable as a single factor from which to key range condition classes. Forage stand on excellent ranges is always adequate for

maximum production, or it could not classify in excellent condition. Whenever the climax plants thin down to the point that they no longer make full use of the available soil moisture, other plants invade, unless prevented by active erosion, and the range condition class is lowered. Composition must be checked at regular intervals through the year and regularly from year to year. Sparse stands of climax plants will usually be invaded by other plants (annuals or perennials) during sometime in the year. The condition class will not be excellent unless at least 75% of the total plants were of climax rank. Significant changes in stand or density of a particular species help to indicate upward or downward trends in range condition.

Vigor is an excellent indicator of trend in range condition, because excellent ranges with lowering vigor will soon go down to a lower condition. A good condition range, high in vigor, is advancing upward toward excellent condition. Vigor alone, however, is not a safe factor from which to key range condition, because range in poor condition may be high in vigor if it is being grazed correctly.

Abundance or absence of grassland litter in addition to the uses made of them in our range condition guide sheet is also helpful in telling whether ranges are improving or deteriorating. Ranges on which litter is accumulating are generally on the upgrade and those with no litter or decreasing amounts of litter, are generally on the downgrade. A range with 100% climax plants that is being overused and losing its litter is degrading; on the other hand, a poor condition range with only annual plants may have adequate litter for soil protection.

Active erosion may be present in varying degrees on ranges in the lower condition classes. Erosion scars healed over may be in evidence on ranges in

good and excellent condition, in instances where these ranges have improved from a lower condition class. Not all ranges in the low condition classes are eroding. Properly managed ranges in poor or fair condition may not be eroding.

Ranges in best condition yield maximum livestock production per acre, but other factors also affect production, such as livestock breeding, feeding, and general management. Livestock on properly managed, even on low condition, ranges make satisfactory gains, conversely unsatisfactory gains result where too many animals are grazed on excellent condition ranges. Satisfactory calving and lambing percentages may be obtained on poor condition ranges when they are stocked so that all livestock reveive a full ration.

Ranges in excellent condition usually furnish the most grazing for livestock. However, there are a few situations where it is desirable to keep part of the range in a lower condition class because the kinds of plants found there may provide forage for certain seasonal needs that an excellent range does not adequately provide for. Example, early cheatgrass for early spring feed for ewes with young lambs. When this is done, special care must be exercised to control or prevent the invasion of undesirable plants that come in where ranges are below excellent condition. A range in poor condition can never become excellent no matter how good the management, unless there are enough of the remanent climax plants present to provide the seed from which an excellent range can develop. On large areas of our western range in poor condition, climax plants, or introduced plants similar to the climax in quality and production, must be artificially seeded before the ranges shall have the potentialities to develop into excellent condition. How to do this economically constitutes a major problem of revegetation that extends over all the western states.

Thus, it is evident that while plant composition in most instances provide the stable and satisfactory factor from which to key range condition classes, there are several other factors which must be correlated with it to definitely determine whether ranges are improving or degrading.

How to determine safe stocking rates for range condition classes

A. Information as to the most desirable kinds of vegetation and the relatively safe stocking rates of ranges in Excellent, Good, Fair, and Poor Conditions is most useful if it is obtained in the locality where it is to be used. Ranges in excellent or good condition are the best sources of background information. In some areas, local experiment stations can provide the essential facts, but in most instances, such information will have to be gathered on ranches in the district that come nearest to meeting the requirements, or transferred, to start with, from similar areas some distance away where safe grazing rates have been studied longer and are better known.

B. Once the various range sites have been located in a soil conservation district, the examiner will make thorough coverage of the respective sites and summarize the list of most important vegetation for each site. Information should be obtained from 3 or 4 similar ranches if dependable facts can be found. The examiner will use this, plus other available information, to correlate vegetation with site and range condition in accordance with instructions already set forth.

C. Instructions for Collection of Grazing History of Key Ranges

1. Selection of range or pasture

a. The area studied should be typical of the kind of vegetation, precipitation, topography, climate and soil on the area for which information is desired and should be grazed by the same kind of livestock and wildlife.

b. The area should show signs of improving range condition

(1) The examiner will be guided by the following indicators of improving condition:

(a) Increasing stand, improving composition, and vigor of desirable forage species as judged by color, general appearance, height growth, and soil tilth.

(b) Healing of erosion scars.

(c) Evidence of good distribution of grazing.

c. The range or pasture should be of sufficient size to afford a reliable sample.

d. The area should be adequately fenced to confine the movements of livestock to the area being studied and to prevent trespass of outside livestock.

2. Records of past stocking

a. The examiner should select range land for study where the operator has kept stocking records for a number of years.

(1) Grazing records kept for ten years or longer correlated with weather records are best.

(2) Four years of good records should be considered the acceptable minimum.

(3) Written records arethe most desirable, but in the absence of those, good memory records are usable.

(4) Always correlate grazing history with past precipitation records where possible.

b. The records should include the following data:

(1) Number of head of each kind and class of livestock grazed on the unit. (Horses, cows, yearling steers, two-year-old steers, sheep, etc.) This information is essential in order to be able to convert the livestock grazed to a common unit.

(2) Length of the grazing season each year.

(a) Approximate, or exact, date stock turned on pasture.

(b) Approximate, or exact, date of removal.

(3) Reasons for yearly variation either in number of animal units grazed or length of grazing season when the departure from the average is significant.

Determining forage yields by plot clippings and weights

Forage yields, determined by plot clipping weights, are reliable indexes to forage yields for the year the clippings are made.

Range condition class guide sheet stocking rates, based on one year's clippings must, therefore, be considered as tentative and adjusted as quickly as possible to account for yearly fluctuations in forage yields, due to climatic variations.

This may be done by clipping plots on the same areas over a period of at least four years (longer if possible) or by adjusting long time (4 to 10 year) use records, obtained from properly managed ranges in the locality to fit the sites and condition classes for which no use records are available. The following paragraphs explain how this is accomplished.

Adequate series of plot clippings and their average weights should be made and used to determine forage yields on various range site condition classes:

1. Whenever reliable (4 to 10 year) use records on typical and properly managed privately-owned or experiment station ranges cannot be obtained,

or

2. Until reliable use records from typical and properly managed ranges can be obtained,

or

3. To determine forage yield indexes for the various range sites and their respective condition classes for the purpose of:

   a. Directly correlating significant changes in plant composition with corresponding changes in forage yields.

   b. Expressing forage yields in pounds (air dry) usable forage per acre, which can be readily converted to stocking rates in acres per A.U.M.

   c. Providing a basis for using available (4 to 10 year) use records from one site in a given locality, to determine stocking rates for adjacent sites, and their respective condition classes for which no use records are available. The following example explains how this can be done:

      The 10 year average stocking rate for a properly grazed, typical range unit in the rolling benchland site, in the bottom of the good condition class, equals 2 Acres/AUM. A series of plot clippings on this unit shows that an average of 500 pounds of usable forage per acre was produced in 1950. The average weight of a series of plot clippings, made the same year, on a steep south (facing) slope site, also in the bottom of the good condition class, equals 150 pounds of usable forage per acre. No use records are available for this site.

How do I determine the average stocking rate for the steep south slope site from the above information?

150 pounds usable forage (produced on the S.S.S. Site) is to 500 pounds usable forage (produced on the R.B. Site) as 2 Acres/AUM (records from R.B. Site) is to y Acres/AUM.

Solve for y. $500 \times 2 = 1000$

$150 \times y = 150y \qquad y = \frac{1000}{150} = 6.7$ Acres/AUM

The average stocking rate for the bottom of the good condition class on the steep south slope site, that more closely accounts for yearly forage fluctuation is, therefore, 6.7 acres per animal unit month.

Average stocking rates for the other condition classes on this site and the stocking rates for respective condition classes on other sites may be determined in a similar manner.

NOTE: Technical Note No. 10 explains in detail the use of plots in determining tentative forage yields. Every technician engaged in range conservation work should thoroughly familiarize himself with the contents of this Technical Note. It is suggested that Technical Notes Nos. 10 and 22 be attached to this guide for ready reference and use.

Animal Unit Equivalents

For the purpose of planning the use of range lands and estimating degree of use, the standard livestock unit will be the "animal unit" defined as one mature cow, with or without unweaned calf at side, or equivalent.

The following equivalent values will be considered as standard to be used in the Soil Conservation Service in connection with the foregoing purposes:

Cattle:

Weaned calves[1/] and yearlings	.6 Animal Unit
Mature cows and steers (cows with or without unweaned calf at side)	1.0 Animal Unit
Bulls, 2 years and over	1.3 Animal Unit

Horses:

Yearlings[1/]	.75 Animal Unit
Two-year-olds	1.00 Animal Unit
Three-year-olds and over	1.25 Animal Unit

1/ Weaned calves, lambs, kids and yearlings are defined as animals from weaning age to 12 months from weaning.

Sheep, Goats, and Deer:

5 weaned lambs, kids and yearlings	.6 Animal Unit
5 ewes or does, with or without unweaned lambs or kids	1.0 Animal Unit
5 rams or bucks	1.3 Animal Unit
5 deer	1.00 Animal Unit

Note: Converting equivalents should not be used to convert grazing capacity estimates from sheep and goats to cattle and horses. The grazing capacity for each kind of livestock should be based on the kind of plants that are grazed by each kind of livestock.

Livestock Feeding Tables

Livestock feeding tables have been developed in cooperation with state experiment stations, state colleges, and universities for:

1. Northern Idaho
2. Southern Idaho
3. Eastern Washington
4. Eastern Oregon

Similar tables need to be developed for California and Nevada.

The feeding tables used in ranch conservation planning and application in your locality should be attached to your copy of the range conservation guide and considered a part of the guide.

OUTLINE

THE ESSENTIAL STEPS IN DEVELOPING A RANGE CONSERVATION PROGRAM

PART I

How to Work with Rancher Groups and their Leaders
to Plan and Apply Range Improvement Programs

I. Outline to the rancher your soil conservation district program for range improvement.

A. Objective of program

1. Increase ranch profits through increased pounds of livestock products produced per acre of range or dryland seeding by:
   a. Increasing the forage production where possible through recognition of the growth requirements of key forage plants.
   b. Improving the grazing use of forage presently produced through improved grazing distribution.

2. Soil and water conservation thru range improvement

   Props:
   a. Visual aids of water penetration and retention.
   b. National public relations of rancher's desire to improve grazing land.
   c. Statistics -- acres of range in SCD - map of soil conservation districts in United States.

B. Soil Conservation District Program

1. Forage management practices
   a. Rotational deferred grazing
   b. Proper utilization
   c. Range readiness

2. Enabling practices
   a. Salting
   b. Water development
   c. Fences
   d. Riding or herding
   e. Supplemental pastures
   f. Feed reserves

3. Special forage practices
   a. Seeding or reseeding
   b. Fertilization
   c. Water spreading
   d. Brush control
   e. Noxious plant control

Examples of Props to Use

How a Plant Grows

Growth Curve Chart

Examples of simple charts showing rotational-deferred system

Range condition monoliths

Slides & photos (local)

II. Role soil conservation district plays in planning range improvement on individual ranches

A. Technical Tools

1. Soil conservation district range condition guide
   a. Sites -- climax or desirable forage plants' composition
   b. Relative forage production of sites and range condition

2. Technical guide (Service tool)
   a. Practice detail

3. Utilization guide (rancher's tool)

B. How these tools are used

1. Conservation surveys -- a record of
   a. Present forage resources
   b. Potentiality for forage improvement
   c. Makes possible the identification of problems resulting from past management

2. To make clear the objective of conservation planning to help fit the necessary practices to your ranch according to the latest "know-how."

3. Establish the basis to periodically review the results of the plan and make necessary adjustments

III. Rancher's role in planning range improvement

A. Request assistance from soil conservation district
   1. What do you want first?
   2. What do you think you might in the future?

B. When can we get together on your ranch to look at your immediate problems?

C. If you want a complete conservation program for your ranch, when can we help you with:
   1. Conservation survey on cropland and rangeland
   2. Feed and livestock inventory (present and potential)
   3. Analysis of the operations of your outfit
   4. Plan for future operations

IV. Applying the plan

A. The soil conservation district can assist you with:
   1. Equipment, if available
   2. Uncommon grasses and legumes for field trials

3. Special technical assistance in such fields as:

   a. Agronomy
   b. Range
      (1) Effectiveness of management plan in forage improvement and distribution of grazing use
      (2) Application of enabling practices
      (3) Application of special forage improvement practices
   c. Soils
   d. Engineering

4. Coordination of effort in correcting community land use problems such as noxious weed control, drainage, etc.

5. Coordination of services from various agencies

B. Your plan will be more effective if you will:

1. Keep accurate records on stock numbers, ages, and dates of use in each pasture

2. Observe during the grazing season the distribution and intensity of grazing use and change of salting stations, more frequent riding, etc. to improve distribution of use.

3. Keep market weight records, calf and lamb crops, etc.

4. Make suggestions that can be passed on to other ranchers who want to apply a conservation program.

PART II

How to use the Technical Tools of Range Conservation with Rancher Groups for Planning and Applying Conservation Programs

RANGE SITES:

I. Clearly define range sites. Show how sites:

A. Aid conservation planning because:
1. Each site has certain inherent forage productivity
2. Each site has inherent forage composition (Climax or desirable annual plants)

II. How to recognize range sites

A. By definite land forms made up of factors which rancher can readily identify:
1. Topography
2. Soils
3. Exposure
4. Slope
5. Vegetation

B. How recognition of definite plant communities assist in identification of site:
1. Climax perennial cover (importance)
2. Desirable annual and perennial vegetation in southern and central California

C. Signifigantly different management problems, especially safe degree of use, as they apply to the four recognizable conditions of each site.

III. Description of sites

A. Name
1. Brief, common description of the land forms--examples are:
a. Dry meadow
b. Moderate south exposure (grassed foothills)
c. Steep north exposure
d. Oak savannah

B. How symbols are placed on maps (factors mapped by symbol)
1. Capability class, sub class, and unit
2. Range site synonymous with range land capability unit

C. Brief narrative description of site
   1. Where site occurs
   2. Physical land factors
      a. Soils, topography, exposure, slope
   3. Vegetative composition, which is associated with site
      a. Desirable perennials and annuals in southern and central California
      b. Climax vegetation - decreasers, increasers, invaders

D. Photo (good example)

E. List of decreasers, increasers and invader plants

IV. Mapping sites

A. Delineate boundary by solid line on aerial map

B. Symbolize by appropriate shorthand symbols on aerial map
   1. Soil, slope, erosion
   2. Land capability unit

RANGE CONDITION:

V. Clearly define range condition classes. Show their use in applying range conservation practices.

A. Aid to conservation planning because:

   1. a. Show that range condition classes are bases of applying needed remedial measures and management practices.
      b. How to establish grazing rates and grazing use of each condition class as determined by degree of depletion or departure from climax for each condition class (excellent, good, fair, and poor).

   2. Record of location and intensity of management problems.

   3. Acquaints conservation planner with forage resources and records or lists them in orderly and usable manner.

   4. Forces recognition of the important point that plants have a definite response to grazing use.

VI. How to recognize range condition

A. Present plant composition compared with potential.

VII. Description of range condition

A. How range condition guides by sites are made

1. Plant composition of excellent condition shown in percent
   a. Decreasers or desirable plants
   b. Increasers or less desirable plants
   c. Invaders or undesirable plants

2. Physical land factors commonly occurring in site, correlated with each condition class.

3. How forage production by condition class is determined.

4. Legend for mapping range condition.

B. Range trend guide by site

1. How certain earmarks or criteria of each condition class indicate whether range is getting better or worse.

2. Description of indicators of range trend
   a. Litter and plant residues
   b. Current erosion
   c. Plant vigor
   d. Things to look for that show change of plant composition
   e. Kind of plant seedlings (good or bad) that can be identified
   f. Changes in stand (density) (thinner or thicker)

VIII. How to map range condition

A. Delineate by dotted line on aerial photo except when range site and condition class coincide.

B. Record data on write-up sheet
   1. Vegetation composition
   2. Range site
   3. Physical land factors of site
   4. Estimated forage production
   5. Trend factors (kind of new seedlings, vigor, density of stand, amount of litter, erosion activity, etc.)
   6. Other information pertaining to management or problems shown on map or in the notes.

C. Record on aerial map by appropriate shorthand symbol
   1. Identification of field write-up sheet
   2. Range condition

GUIDE TO DEGREE OF USE
(Utilization Check)

Percent of Proper Use	Degree of Use		Qualitative Description	End-of-Season Adjustments that may be considered (Spaces to be filled locally)
	Adjective Description	Color Legend (Mongol)		
0	Unused	945 M	No livestock use	
25	Slight	998 M	Practically undisturbed	
50	Light	948 M	Only best plants grazed	
75	Moderate	953 M	Most of the range being grazed. Little or no use of poor plants.	
100	Full	967 M	All of the range being grazed. The primary forage species are properly utilized.	
125	Close	962 M	All of the range plainly shows use and major sections are closely cropped. Some use of low-value plants.	
150	Severe	946 M	Hedged appearance of shrubs and trampling damage. Primary forage plants almost completely used. Low-value plants carrying grazing load.	
175	Extreme	966 M	Range appears stripped of vegetation. Primary forage plants weak from repeated cropping. Low value plants closely grazed.	
200	Destructive	976 M	Much death loss of primary species. Only remnants of good plants survive. Appearance approaches that of a corral.	

(Adapted from "A Field Method of Judging Range Utilization" by M.H. Deming, mimeo. U.S.D.A., Div. of Grazing, 1930)

Procedures for Conducting a Utilization Check

1. Use a copy of the range condition survey map as a base (a base aerial mosaic or line map of the ranch which shows only the cultural features, site and range condition lines serves best).

2. Map and show by red boundary solid lines the boundaries of the different utilization zones in each grazing unit which you and the rancher readily recognize as areas of different intensities of use.

3. Locate on the utilization map the salting stations used during the current year.

4. Locate and show on the map the watering places (if not already shown).

5. Using the chart as a guide, you and the rancher judge the degree of range use in each utilization zone mapped, and identify each by one of the nine adjective descriptions which best describes the degree of use.

6. Color the utilization map (using the color legend shown on the guide chart) to show:

   a. Pattern of grazing
   b. Need for additional water developments
   c. Need for changing the salt distribution plan
   d. Desirability of changes in fences or need for additional fencing
   e. Need for adjustment in amount of use

The proper use figures in the extreme left hand column of the guide can be used to complete the weighted average percent of proper utilization of a grazing unit and determine the adjustment in numbers of livestock or AUMs use to recommend to avoid overgrazing or to increase the grazing in underutilized grazing units.

The weighted average percent of proper utilization of the forage in a particular pasture (grazing unit)may be made by:

1. Determining the percentage of grazing unit forage resource that is produced in each utilization zone. The range condition survey map (on which you computed stocking) serves very well for this purpose. It gives you the estimated AUMs grazing in each range condition area divided by the total pasture (grazing unit) AUMs equals the percentage of the pasture forage resource that is produced in respective condition areas.

   Condition classes in respective range sites are usually the result of previous year's differences in degrees of utilization. Frequently these condition classe will coincide with current year's utilization zones. Deviations from this may be met by determining the acreages and AUMs forage produced in each part of a condition area that falls in different utilization zones. The sum of the AUMs forage produced in each utilization zone may then be used to determine the percentage of the pasture forage resource that is produced in respective utilizatio zones.

2. Multiply the percent of pasture (G.U.) forage produced in each utilization zone by its applicable percent of proper utilization. The percent of proper use for the nine degrees of use is obtained from the Guide to Degree of Use sheet (extreme left hand column). The sum of the products of the percent proper use and the percent of the pasture forage resource of all the utilization zones in a pasture divided by 100 equals the weighted average proper utilization of the forage produced in a given grazing unit or pasture.

UTILIZATION:

IX. How utilization checks provide basis of management

A. Aid in applying and adjusting conservation program because:
1. Shows pattern of grazing distribution
2. Shows intensity of grazing use
3. Shows efficiency of forage use
4. Shows range trends
5. Indicates management problems
6. Shows needs for adjusting management
7. Shows needs for maintenance of range improvements

B. Psychological benefits to the program derived from recuring contacts with rancher.

C. Affords opportunity to evaluate methods used and results of program which benefit:
1. Rancher, individually) Thru talks, articles
2. Rancher groups (group demonstration,
3. Effective ammunition for selling program) local observation

X. Description

A. How utilization guide by sites and condition classes are made
1. Determine safe degree for each condition class for key forage species.
2. List of key forage plants.
3. Explain job sheet on mechanics of checking and mapping utilization.

XI. How to work with rancher in making range utilization checks

A. Agree on how to determine utilization zones and how to calculate average degree of use.

B. Record on map for future reference as a basis for improving.

C. In every case establish the fact that ranchers can do this alone after brief group training.

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